



ADEPT

EFFICIENT POWER CONVERSION

PROJECTS:	14	FUNDING YEAR:	2010
TOTAL INVESTMENT:	\$34.5 million	PROGRAM DIRECTOR:	Dr. Rajeev Ram
PROJECT DETAILS:	www.arpa-e.energy.gov/ProgramsProjects/ADEPT.aspx		

PROGRAM

In today's increasingly electrified world, power conversion—the process of converting electricity between different currents, voltage levels, and frequencies—forms a vital link between the electronic devices we use every day and the sources of power required to run them. The 14 projects that make up ARPA-E's ADEPT program, short for "Agile Delivery of Electrical Power Technology," are paving the way for more energy efficient power conversion and advancing the basic building blocks of power conversion: circuits, transistors, inductors, transformers, and capacitors.

INNOVATION NEED

Around 30% of the electricity used in the U.S. today flows through power converters, and a significant amount of energy is lost when that electricity is modified to a different current or voltage. That's because most power converters are based on decades-old technology and rely on expensive, bulky, and failure-prone components. The U.S. Department of Energy estimates that in 20 years 80% of the electricity used in the U.S. will flow through power converters, so there is a critical need to improve their efficiency.

ADEPT PROGRAM GOALS

- Improve the energy efficiency of electronic devices and power systems
- Contribute to the development of a smart grid

Power converter technology is fairly straightforward. All electronic devices are built to operate with a certain type and amount of electrical energy, but this is often not the same type or amount of electrical energy that comes out of the outlet in your wall. For example, most power lines deliver high-voltage alternating current to homes and businesses, but some computers require low-voltage direct current to operate. Converters in the computer modify the electrical energy to the correct voltage and current. Power stations also use power converters on a larger scale to modify electrical energy so it can be efficiently transmitted over power lines and into homes and buildings.

POTENTIAL IMPACT

If successful, the innovations developed under the ADEPT program would increase energy efficiency, improve the performance of electrical devices, and accelerate growth of the smart grid, the term used to describe the advanced electrical infrastructure that will replace today's outdated electrical grid.

- **SECURITY:** ADEPT program innovations could contribute to a smarter, more advanced, and more reliable electrical power grid.
- **ENVIRONMENT:** More efficient electrical devices could reduce U.S. electricity consumption by up to 30%, and in turn reduce the harmful emissions created by power plants.
- **ECONOMY:** ADEPT program innovations could help establish U.S. businesses as technical leaders in power electronics, and bring lower power bills and less expensive electronics to American consumers.
- **JOBS:** The success of ADEPT projects could create high-skill, high-paying jobs in fields like engineering, research, and manufacturing.